To find the day of the week corresponding to a given date, add to the day of the month the index number of the month and the index number of the year, then subtract the largest multiple of seven that is less than the sum. The remainder will be the number of the day of the week.

The index numbers of the months are as follows:

January, 3 (in leap years, 2).
February, 6 (in leap years, 5).
March, 6.
April, 2.
May, 4.
June, 0.
July, 2.
August, 5.
September, 1.
October, 3.
November, 6.
December, 1.

To find the index number of the year, for any year from 1800 to 1899 inclusive, increase the excess of the year over 1800 by one-fourth of itself (discarding fractions) and subtract the largest multiple of seven contained in the sum. For dates in other centuries a multiple of 28 is added or subtracted so as to bring the year within the above limits, and, after finding the index number for the resulting year, one is likewise added or subtracted for each centesimal year not divisible by 400 that is passed over (or of which the beginning is passed over). If many years are to be passed over it is often convenient to use multiples of 112.

A few illustrations of the application of this rule are here given. To find the day of the week corresponding to August 20, 1898, we add the index numbers of the year, 3, and of the month, 5, to 20, and subtract 3 times 7. The remainder, 7, indicates that this is the seventh day of the week, or Saturday. If the index numbers of all the months and of a given year are known, it is ordinarily quicker to find the day of the week mentally than to consult a calendar of the given year. For July 4, 1776, we add 28 to 1776 and find the index number of 1804 to be 5; adding one for the year 1800 passed over gives 6, the index number of 1776; to which we add $2+4$; subtracting 7 we have the remainder 5, indicating Thursday. For December 25, 2046, we deduct 224 from the year and find the index number of 1822 to be 6. Deducting one for the year 1900 passed over (2000 is divisible by 400 and so is a leap year and requires no deduction), we find 5 as the index number of the year 2046. Adding $1+25$ we find that Christmas of that year will come on Tuesday.

As this subject is so simple it would be unnecessary to give a deduction of the rule. But it may be noted that if the index numbers of the months are not remembered, that of one month may be found by adding the index number of the year to the day of the month (for any date for which the day of the week is known) and subtracting the sum from the day of the week increased by a multiple of seven. The index numbers of the remaining months may then be obtained in succession, as the index number of any month, except January, is equal to that of the preceding month increased by the number of days therein and diminished by a multiple of 7.

Dates given in old, or Julian, style should first be changed to new, or Gregorian, style. The Dominical letter of any year may be found by deducting the index number of the year from 5 or 12. Thus for 1898 we have $5-3=2$, indicating the second letter of the alphabet, or B, as the Dominical letter.

If in time it should be more convenient to calculate the index numbers of the years from the excess of the years over 1900 instead of 1800, that modification of the rule may be made if the index numbers of the months are increased by 5 or diminished by 2.

EDWARD L. STABLER.

BROOKLYN, N. Y.

AN APPLE CANKER.*

LAST spring I began investigating the cause of the so-called apple canker. This disease attacks the bark of the larger limbs, where all stages of development may be seen from small sunken areas to the large cankers of many inches extent. In aggravated cases a portion of the wood is laid bare. The bark becomes swollen and rough in all directions from the

* M. B. Waite, *Rural New Yorker*, February 5, 1898, p. 82.

wound, so that the diseased limbs become quite conspicuous. These wounds produce an effect similar to girdling, and where many limbs are attacked the effect on a tree is disastrous.

In preliminary work on the disease certain large dark-colored spores were continually found, but they were supposed to come from some saprophyte not worthy of attention. In cultures made from diseased bark this form, together with another, continually appeared. Finally both forms were separated and transferred to bean stems in test tubes. In the one case the familiar dark spores were produced, while in the other the sporophores of *Schizophyllum commune* were formed.

Inoculations were made with both forms on apple seedlings in the nursery and on limbs of an apple tree. In two weeks' time it was found that in every case inoculations made from the fungus with dark spores had taken effect, while the *Schizophyllum* had in no instance made any growth. The wounds made in the bark of check trees healed over at once. More inoculations were now made and the results have been the same. At this date, October 9th, several of the seedlings are nearly girdled with wounds three to four inches in length. The inoculations on the limbs of apple trees have made an equally satisfactory growth, laying bare the wood and producing the dead, sunken areas of bark characteristic of the disease.

When it was found that the fungus with the dark spores was parasitic, diligent search was made for the spores on diseased bark, but none were to be found. This was in the fore part of July. Further search throughout the summer failed to reveal any of the spores.

On September 11th Mr. F. C. Stewart, Botanist of this Station, examined the test-tube cultures and at once noted the strong resemblance of the dark spores to those of the black rot of the apple, *Sphæropsis malorum*, Peck. Mature apples were at once inoculated with material from the test tubes. In twenty-four hours decay had begun around points of inoculation, and in 16 days pycindia and mature spores of *Sphæropsis* were found on all inoculated apples. The check apples which were punctured but not inoculated remained sound. Further search for the dark spores on diseased bark revealed pycnidia just beneath the epidermis containing the mature brown spores and immature ones still attached. All characters were identical with *Sphæropsis* on the fruit. These same pycnidia were subsequently found on bark of the nursery stock and apple-tree limbs where the inoculations were made. Pure cultures of *Sphæropsis malorum* from apples make the same growth on bean stems and bear fruit in exactly the same manner as the first cultures from which the inoculations were made.

While it seems reasonably certain that this canker of the apple is caused by a well-known fungus in a hitherto unrecognized rôle, the result of a set of experiments now under way is awaited to complete the chain of evidence. Seedlings placed in the greenhouse have been inoculated with pure cultures of *Sphæropsis malorum* taken from affected apples. If these inoculations produce the so-called canker the identity of the disease will be established.

W. PADDOCK.

WAMPUM BELTS.

TO THE EDITOR OF SCIENCE: Thanks for the kind notice of my article on wampum by my esteemed friend, Dr. Brinton. I wish, however, to correct the word 'acknowledges,' as it seems to imply that I believe in the early use of council wampum, a belief against which I have argued for years. In a very mild way I stated that 'it is very doubtful whether wampum belts were used before the coming of the whites as necessary or ordinary parts of Indian councils.' I thought quill belts might have been used, as in the Onondaga tradition of Hiawatha. Because of the great rarity of shell beads on early sites in New York and Canada, I thought 'a mistake has been made regarding Cartier's account of Hochelagan beads in 1535.' But one shell bead has been found at Hochelaga, and there is a corresponding rarity on early Mohawk and Onondaga sites. Quoting another I said, "My own experience is the same, Prehistoric Onondaga sites yield few shell articles or none at all."

I have examined as many wampum belts and as much council wampum as most men, and my conclusion is precisely that of Dr. Brinton.